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MEMORANDUM FOR AMSAM-RA

SUBJECT: Decision Document for an Interim Remedial Action at RSA-95, Former Degreaser Unit and TCE/TCA Solvent Still 2, Redstone Arsenal, Alabama

- 1. The Army has adopted the term "decision document" for the certification of removal or interim remedial actions, and remedial action decisions at National Priority List installations (i.e., Redstone Arsenal). This document requires signature from the Deputy Post Commander.
- 2. Please review and approve the enclosed document by signing section 10.2, page 10.
- 3. The POC for this action is Ms. Terry de la Paz, 5-6968.

Encl

OE L. DAVIS

Actg Director, Directorate of Environmental Management and Planning

DECISION DOCUMENT

INTERIM REMEDIAL ACTION GROUNDWATER PUMP AND TREAT SYSTEM

RSA-95 FORMER DEGREASER UNIT AND TCE/TCA SOLVENT STILL 2

OU-10 FORMER REDSTONE ARSENAL ROCKET ENGINE FACILITY NORTH PLANT REDSTONE ARSENAL, ALABAMA

EPA ID NO. AL7 210 020 742

JUNE 1999

ACRONYMS

ADEM	Alabama Department of Environmental Management
AMCOM	U.S. Army Aviation and Missile Command
AR	U.S. Army Regulation
CERCLA	Comprehensive Environmental Response, Compensation,
	and Liability Act
CFR	Code of Federal Regulations
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
EPA	U.S. Environmental Protection Agency
FY	Fiscal Year
IRA	Interim Remedial Action
ug/l	microgram per liter
NCP	National Contingency Plan
OU	Operable Unit
RI/FS	Remedial Investigation/Feasibility Study
RSA	Redstone Arsenal
SARA	Superfund Amendments Reauthorization Act
SWMU	solid waste management unit
TCA	1,1,1 - trichloroethane
TCE	trichloroethylene
VOCs	volatile organic compounds

1.0 INTRODUCTION

This decision document describes the remedial alternative selected to treat contaminated groundwater present at a solid waste management units (SWMU) located on Redstone Arsenal, Alabama (RSA). The SWMU, RSA-95, is a former degreaser unit and TCE/TCA solvent still located within Operable Unit (OU) 10 (Figure 1-1). Chlorinated solvents have been found in groundwater in this operable unit at concentrations exceeding 1,000,000 micrograms per liter (ug/l). Free phase product is likely present. Off-site contamination is expected to have resulted from the releases. The selected remedy will be implemented as soon as possible, pending funding availability.

The described action is an Interim Remedial Action (IRA), chosen in accordance with the CERCLA as amended by the SARA, the NCP, and AR 200-1, as applicable.

2.0 RSA/OU-10 SITE HISTORY

The area now known as Redstone Arsenal was originally established as three separate facilities in 1941, the Huntsville Arsenal, Redstone Ordnance Plant, and the Gulf Chemical Warfare Depot. In 1949, all three facilities combined to form the Redstone Arsenal. OU-10 is the site of the former Redstone Arsenal Rocket Engine (RARE) Facility, North Plant. The RARE North Plant (OU-10) is located in the former Redstone Ordnance Plant.

The Redstone Ordnance Plant was used by the Army to produce conventional ammunition and chemical munitions for W.W. II from 1942 to 1945. The facility was placed on standby until 1949, when the Elkton Division of the Thiokol Corporation signed a contract for the research and development (R&D) of rocket propellants. The R&D work eventually included the manufacturing of rocket propellants that continued until Thiokol ceased all operations in 1996. Redstone Arsenal was placed on the US EPA's National Priorities List (NPL) in June 1994.

RSA-95 was a vapor-degreasing unit with a distillation unit designed to reclaim solvents, located at building 7368. Trichloroethene (TCE) was the primary degreasing agent; however, 1,1,1-trichloroethane (TCA) was also used at RSA-95. The entire OU has been impacted by past activities resulting in regional groundwater contamination.

3.0 OU-10 GENERAL LOCATION

OU-10 covers approximately 960 acres, located along the eastern boundary of RSA. East of OU-10, outside of RSA boundaries, is a utility easement owned by the City of Huntsville. Beyond the easement is a residential development, known as English Village. A recreational park owned by the city is also present in this area. Northeast of OU-10 is a privately owned and operated fishing and hunting club (Huntsville Rod and Gun Club). The northwest boundary of the OU is a wetland area adjacent to Huntsville Spring Branch (HSB), which HSB flows generally from the northeast to the southwest across RSA, draining into the Tennessee River.

4.0 PERTINENT REGULATORY INFORMATION

RSA-95 has been under investigation since 1991 in accordance with DoD's Defense Environmental Restoration Program (DERP) and RSA's Installation Restoration Program (IRP). A Site Investigation (SI) has been completed for RSA-95 and a Remedial Investigation (RI) is currently ongoing.

Groundwater monitoring wells located at RSA-95 have shown levels of TCE in excess of 200,000 ug/l. The maximum contaminant level (MCL) for TCE in drinking water as set by the US EPA is 5 ug/l. In addition, groundwater samples taken downgradient and along RSA's southeastern property boundary have shown concentrations ranging from 3 to 120 ug/l.

The US EPA and the Alabama Department of Environmental Management (ADEM) conducted a site visit at OU-10 on April 12, 1999. As a result, EPA/ADEM issued a letter recommending the following:

"Extraction wells are needed as soon as possible to begin the remediation of the known TCE groundwater contamination and delay the suspected groundwater contamination movement. Do not wait until an elaborate and intricate system is designed. Focus on the installation of extraction wells where the groundwater contamination is known to exist. Interim actions should be started as soon as possible."

Prior to the EPA/ADEM issuance, RSA had begun design of a groundwater treatment system that would focus on hotspot removal and restrict additional contaminant migration. EPA/ADEM's concern served to further validate RSA's opinion that immediate action should be taken.

5.0 SITE HYDROGEOLOGY

The site is generally underlain by a veneer of soil derived from the in-place weathering of parent bedrock. soils are generally very clayey in nature with relatively low permeability, except where relict bedding structures are present as a result of the weathering of the parent rock. Groundwater occurs in this zone at varying depths but is not generally in quantities sufficient for well production. As a rule, groundwater flow in this zone is expected to generally mirror surface topography. However, localized flows may be impacted by nearby surface water drainage features, including ditches, streams, creeks, springs, etc. A northeast-southwest trending groundwater divide is believed to exist directly under the site. As a result, groundwater flow direction for the shallow water-bearing zone underlying RSA-95 is expected to be generally to the southeast and northwest.

At depth, the residuum soils transition into limestone bedrock that is generally flat-lying in the vicinity of RSA. Groundwater flow within the bedrock is very difficult to determine because of the dissolution that has taken place along varying joints, fractures, bedding planes, etc. However, localized flow will likely be influenced by nearby surface water drainage features, including ditches, streams, creeks, springs, etc. Several streams and wetland areas are located directly north and east of OU-10. Based on the information currently available, groundwater flow within the bedrock system underlying the sites is believed to be generally to the east with slight northerly or southerly components.

6.0 SITE RISK

Preliminary results of the remedial investigation at RSA-95 indicate elevated concentrations of TCE in the residuum and bedrock aquifer. The concentrations of TCE at RSA-95 is considered to exceed human health based criteria if off-site migration were to occur and impact either public water supplies or nearby surface water bodies. An extraction well near RSA-95 has shown a concentration of 8,000 ug/l of TCE and 2,100 ug/l of TCA. Other wells within OU-10 have shown concentrations as high as 1,000,000 ug/l of TCE.

As a rule, groundwater in the immediate vicinity of OU-10 is not utilized as a source for drinking water. However, streams and wetland areas do provide potential exposure pathways, especially because of the close proximity to

residential and public recreational areas. A thermal infrared survey recently conducted shows evidence of numerous springs discharging into nearby wetland areas and streams, some of which are located outside of the boundaries of RSA. Groundwater being discharged by these springs likely originates at OU-10. One such stream is located to the east of OU-10 within 50 yards of a public park and a residential housing development.

7.0 OBJECTIVE OF INTERIM REMEDIAL ACTION

As previously noted, TCE has been detected in shallow and deep groundwater monitoring wells at RSA-95 and at elevated levels. Concentrations reflective of free phase product have been found on-site. These levels far exceed current humanhealth standards and as such, require some type of mitigation/action.

The objective of this action is to select a remedy that is cost effective while providing the necessary protection to human health and the environment. In this case, protection of human health and the environment can only be achieved through a significant reduction of the mass of contaminants currently in the subsurface and through controlling the migration of the resultant dissolved contaminant plume.

7.1 Remedial Alternatives

With the required objectives stated in Section 7.0, six remedial technologies were reviewed. They are as follows:

- No Action
- Institutional Controls
- Monitored natural attenuation
- Slurry wall to contain contaminated groundwater
- In-situ accelerated bioremediation
- Groundwater extraction and ex-situ treatment

7.1.1 No Action

The No Action alternative excludes all remedial measures, including any existing institutional controls. No activities would be initiated at RSA-95. The NCP requires this option be evaluated because it provides a baseline from which to compare the developed alternatives. With no treatment undertaken, there would be no reduction of contaminant toxicity, mobility,

or volume "through treatment". Likewise, no treatment-related residuals are generated. All existing waste is left untreated, and the magnitude of risk posed by the site goes unchanged. No actions or controls are initiated to manage this risk, and therefore this alternative affords no long-term protection of human health and the environment. With no action taken, no short-term impacts are caused. There would be no costs associated the implementation of this alternative.

7.1.2 Institutional Controls

Institutional controls are legal or barrier restrictions on the use of land at an environmentally contaminated site that are designed to reduce the dangers from releases or threatened releases of environmental contaminants. Institutional controls may be used in conjunction with engineered remedial actions or as the sole remedy when active measures are determined to be impracticable. With institutional controls, the remedial technologies and process options to be implemented include access restrictions, groundwater use restrictions, and monitoring.

With no treatment undertaken, there is no reduction of contaminant toxicity, mobility, or volume "through treatment". Likewise, no treatment-related residuals are generated. Human health risks associated with exposure on-site would be effectively managed by this alternative. However, if off-site migration of the contaminated groundwater is occurring to the nearby surface water bodies, institutional controls will not be effective in managing risks to human health. In addition, this alternative affords no long-term protection of the environment. Because this alternative is not protective of human health or the environment, it was not selected for the IRA. Likewise, no costs were estimated for this action.

7.1.3 Monitored Natural Attenuation

Monitored natural attenuation may be a viable alternative for the final stages of remediation. However, due to the very high concentrations of chlorinated compounds known at the sites, monitored natural attenuation will not provide the degree of contamination reduction or control of the contaminant plume migration needed. Because this alternative is not protective of human health or the environment, it was not selected for the IRA. Likewise, no costs were estimated for this action. It will be considered in the OU-10 feasibility study as part of the final remedy.

7.1.4 Slurry Wall

Installation of a slurry wall would alter the hydraulic gradient, impeding and redirecting the plum migration, but will not reduce the mass of contaminants in groundwater. In addition, it is only practicable for use in the residuum aquifer and the bulk of the contamination is in the bedrock aquifer. Because this alternative is not technically feasible for the remediation of the contamination in the bedrock aquifer, it is not protective of human health or the environment and was not selected for the IRA. Likewise, no costs were estimated for this action.

7.1.5 In-Situ Bioremediation

In-situ bioremediation technologies comprise both active and passive methods. Active bioremediation consists primarily of either injection or a nutrient stream in water or injection of air. The main passive bioremediation technology is monitored natural attenuation. Chlorinated solvents, such as TCE, are recalcitrant to biodegradation, mainly being degraded as co-metabolites of more easily metabolized aromatic organic compounds. If in-situ bioremediation is to be effective, extensive bench scale and pilot scale testing is required, and may not prove effective in reducing concentrations or in controlling contaminant plume migration. Because of the time and effort involved in conducting the necessary studies and the uncertainty associated with the technical effectiveness of in-situ bioremediation, it was not selected for the IRA. Likewise, no costs were estimated for this action.

7.1.6 Groundwater Extraction and Ex-Situ Treatment

Groundwater extraction will provide an immediate reduction in contaminant mass in the groundwater. In consideration of future site remedial actions, the groundwater extraction Interim Remedial Action (IRA) system can be modified to control or prevent further migration of the most contaminated groundwater. Further, groundwater extraction and treatment is recognized by the U.S. EPA as the presumptive remedy for contaminated groundwater.

Costs associated with the implementation of this alternative are \$1.6 million.

7.2 Selected Remedy

Because of the very high concentrations of TCE in the groundwater and the potential of off-site migration, the groundwater extraction and treatment alternative (Section 7.1.6) was chosen for the IRA. The system will likely operate for a period of 3 years, at which time a final remedy will have been selected and implemented. The IRA system may or may not be part of the final remedy, pending the findings of the currently on-going remedial investigation/feasibility study (RI/FS). The RI/FS report is expected to be complete in FY 01.

This interim remedial action alternative was selected by the U.S. Army Aviation and Missile Command (AMCOM) Environmental Office in concert with ADEM, U.S. EPA Region IV, and the U.S. Army Corps of Engineers, Savannah District.

8.0 PUBLIC/COMMUNITY INVOLVEMENT

It is Department of Defense (DoD) and Army policy to involve the local community as early as possible and throughout the installation restoration process. In accomplishing this goal, RSA is complying with the public participation requirements of CERCLA/SARA, sections 40 CFR 113(k)(2)(a) and 40 CFR 117. A public meeting/information availability session will be held in late FY99 or early FY00 to present the IRA for OU-10. Any public comments received on the IRA at OU-10 will be addressed before implementation.

The public repositories are conveniently located at the Huntsville/Madison County Public Library; the Triana Public Library; AMCOM Environmental Office Library, Building 112; the Redstone Arsenal Historical Office, Sparkman Center, Room 5135; and the Redstone Arsenal Scientific Library, Building 4484.

9.0 DECLARATION

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate to this interim remedial action, and is cost effective. This remedy satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, and volume as principal elements to the maximum extent practicable.

Because the selected remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

COORDINATION AND APPROVAL

The selected alternative for the groundwater IRA at RSA-95 of OU-10 is groundwater extraction and treatment. The total cost of this action is estimated at \$1.6 million. appropriate approval authority for this action is the Commander of the U.S. Army Aviation and Missile Command.

Coordination

PREPARED BY:

REVIEWED BY:

Environmental Engineer, Installation Restoration Division

Directorate of Environmental Management and Planning

Martin W. Walker Chief, Installation Restoration Division Directorate of Environmental Management and Planning

REVIEWED BY:

Director, Directorate of Environmental Management

and Planning

REVIEWED BY:

S. Meredith

Attorney Advisor U.S. Army Aviation

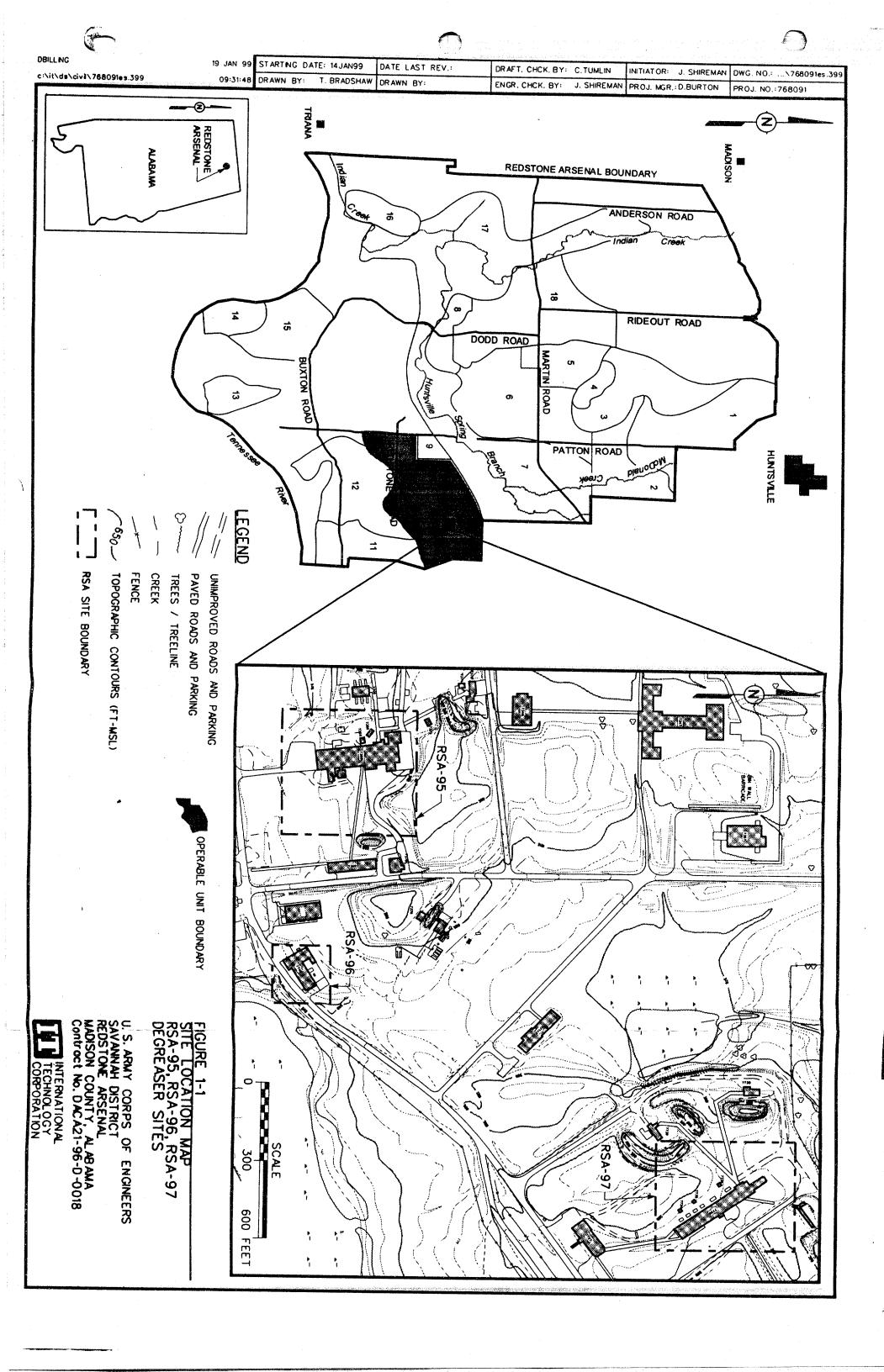
and Missile Command

10.2 Approval

Colonel

Deputy Post Commander, RSA

DATE: 219291



ATTACHMENT A



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

APR 2 2 1999

4WD-FFB
<u>CERTIFIED MAIL</u>
RETURN RECEIPT REQUESTED

Commander

U.S. Army Aviation & Missile Command
Attn: AMSAM-RA-EMP: (Mr. J. Michael Hubbard)
Directorate of Environmental
Management and Planning
Building #112
Redstone Arsenal, Alabama 35898-5300

SUBJ: Site Visit at Operable Unit 10, Redstone Arsenal NPL Site Alabama

Dear Mr. Hubbard:

The Environmental Protection Agency (EPA) and the Alabama Department of Environmental Management (ADEM) conducted a site visit on Monday, April 12, 1999. In consultation with the ADEM, comments and recommendations resulting from that visit are enclosed.

It is the expectation of the EPA and the ADEM that each comment will be addressed with a time table for that action.

Please call me at 404-562-8537 if you have any questions.

Sincerely,

Jim Barksdale, Jr.

Senior Remedial Project Manager

Federal Facilities Branch

Enclosure

cc: Kristy G. Wright, Hazardous Waste Branch, Land Division, ADEM

Terry dela Paz, Redstone Arsenal

U.S. Environmental Protection Agency, Alabama Department of Environmental Management

Comments, Recommendations
Operable Unit 10 Site Visit
Monday April 12, 1999
Redstone Arsenal NPL Site AL

The following comments and recommendations are presented in no particular order, but they are based on a first-hand visit of OU-10 and the adjacent neighborhood.

Extraction Wells -

Extraction wells are needed as soon as possible to begin the remediation of the known TCE groundwater contamination and delay the suspected groundwater contamination movement. Do not wait until an elaborate and intricate system is designed. Focus on the installation of extraction wells where the groundwater contamination is known to exist. Interim actions should be started as soon as possible.

Sampling Off-Redstone -

Sampling off of Redstone is another action that is needed as soon as possible. The sampling should include groundwater as well as sediment and surface soils. The results of sampling will let you know if the groundwater contamination has left Redstone property or not. If the contamination has left the Redstone Installation, Redstone must be prepared to continue the lateral investigation, until the extent is known. Monitoring wells that are located along the eastern boundary of Redstone Arsenal that serve to define the eastern extent of the TCE plume should be sampled as soon as possible. These wells should continue to be sampled on a quarterly basis. Additional wells that are installed should also be monitored on a quarterly basis until the extent of contamination is established and the rate and direction of movement are fully understood. Coordination is needed for the best installation of the extraction wells.

Community Relations Activities -

Historically, community relations activities at Redstone have been very successful. This is another action that needs to get started as soon as possible. Redstone's failure to act quickly to inform the public of the possible groundwater and sediment contamination may result in a credibility gap that will be difficult to overcome in the future. Also, Redstone should be prepared to have a community relations program that is on going with the home owners, do not expect to answer all questions in one meeting. Until such time that a resolution is reached concerning the groundwater contamination from OU-10, Redstone should be prepared to work on a consistent basis with the home owners.

U.S. Environmental Protection Agency, Alabama Department of Environmental Management

Comments, Recommendations Operable Unit 10 Site Visit Monday April 12, 1999 Redstone Arsenal NPL Site AL

Temporary Wells -

While visiting OU-10, several temporary wells were noticed. The condition of the wells was very poor. Any sample collected from the temporary wells observed would be of questionable quality.

About a year ago, work plans presented for OU-18 described the temporary wells seen during this visit. It is not the purpose of this to discuss the EPA's comments from the past. However, the conclusion is the same. If Redstone cannot follow the EPA Region 4 Field SOP for the installation of temporary wells, then Redstone must live with the results of the sample collected.

However, in the name of protecting the subsurface water, the EPA strongly requests that in the future, no longer than thirty-five (35) days from finishing a temporary well that:

- 1) the temporary well will be abandoned following the well abandonment procedures established by the ADEM, or
 - 2) the temporary well will be converted to a permanent monitoring well.